

## CLAIMS

1. An apparatus for measuring decay in intensity of electromagnetic radiation passing through a radiation-absorbent sample due to absorption of radiation by the sample, comprising a source of electromagnetic radiation having a wavelength within an absorption band of the sample,

partially-reflective means for partially reflecting said electromagnetic radiation at successive positions which are spaced apart from each other along a predetermined path through the sample, said partially-reflective means being effective at each said successive position to separate incident radiation into a reflected part which is caused by the partially-reflective means to follow said predetermined path and an unreflected part,

and derivation means for deriving a value of said decay from measurements of intensity of the unreflected parts of the electromagnetic radiation produced at a number of different said positions along said predetermined path.

2. An apparatus as claimed in claim 1 wherein said derivation means derives said value of decay from measurements of intensity of the unreflected parts of the electromagnetic radiation produced at all said positions along said predetermined path.

3. An apparatus as claimed in claim 1 or claim 2 wherein said partially-reflective means comprises a plurality of discrete partially-reflective elements.

4. An apparatus as claimed in claim 1 or claim 2 wherein said partially-reflective means comprises at least one partially-reflective element, the or each said partially-reflective element being arranged to partially reflect said electromagnetic radiation incident at a plurality of said positions.

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5. An apparatus as claimed in claim 4 wherein said partially-reflective means comprises a pair of parallel, partially-reflective plates arranged so that said predetermined path extends alternately between the plates.

6. An apparatus as claimed in claim 1 wherein said partially reflective means is so arranged that said predetermined path occupies a substantially two-dimensional plane.

7. An apparatus as claimed in claim 1 which said partially-reflective means is so arranged that said predetermined path occupies a three-dimensional space.

8. An apparatus as claimed in any one of claims 1 to 7 including a chamber for containing said sample.

9. An apparatus as claimed in claim 8 including means for admitting sample to and discharging sample from, the chamber.

10. An apparatus as claimed in claim 8 or claim 9 wherein said partially-reflective means is supported by or formed in a wall of the chamber.

11. An apparatus as claimed in any one of claims 1 to 10 wherein said partially-reflective means has substantially the same reflection coefficient at each said successive position.

12. An apparatus as claimed in any one of claims 1 to 11 wherein said source of electromagnetic radiation is a pulsed source.

13. An apparatus as claimed in any one of claims 1 to 12 wherein said source of electromagnetic radiation is a monochromatic source.

14. An apparatus as claimed in any one of claims 1 to 12 wherein said source of electromagnetic radiation is a wideband source.

15. An apparatus as claimed in any one of claims 1 to 12 wherein said source simultaneously produces electromagnetic radiation at a number of discrete wavelengths.

16. An apparatus as claimed in any one of claims 1 to 15 wherein said source of electromagnetic radiation produces electromagnetic radiation in the wavelength range

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from 2 nm to 10mm

17. An apparatus as claimed in any one of claims 8 to 10 wherein said source is external to said chamber.

18. An apparatus as claimed in any one of claims 8 to 10 wherein said source is internal to said chamber.

19. An apparatus as claimed in any one of claims 8 to 10 wherein said source forms part of the chamber wall.

20. An apparatus as claimed in claim 5 wherein said source is arranged to direct a beam of electromagnetic radiation onto a surface of one of said plates at an angle to said surface no greater than 10°.

21. An apparatus as claimed in claim 1 wherein said different positions are spaced apart from each other equidistantly.

22. A method for measuring decay in intensity of electromagnetic radiation passing through a radiation-absorbent sample due to absorption of radiation by the sample, comprising,

generating electromagnetic radiation having a wavelength within an absorption

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band of the sample,

partially-reflecting said electromagnetic radiation at successive positions which are spaced apart from each other along a predetermined path through the sample, whereby to separate radiation into a reflected part which is caused to follow said predetermined path and an unreflected part,

and deriving a value of said decay from measurements of intensity of the unreflected parts of the electromagnetic radiation produced at a number of different said positions along said predetermined path.

23. An apparatus substantially as hereindescribed with reference to Figures 5 to 11 of the accompanying drawings.

24. A method substantially as hereindescribed with reference to Figures 5 to 11 of the accompanying drawings.

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